**ARSA INSIGHT:** REDRESS YOUR AVIATION GRIEVANCES **PAGE 42**

SEPTEMBER 2015

# AMT AIRCRAFT MAINTENANCE TECHNOLOGY

MANAGEMENT • OPERATIONS • INSIGHT

**BUSINESS** AVIATION

## PAINT: WHAT'S IMPORTANT?

*AMT* takes a look at the trends and technology concerning paint and painting services **PAGE 16**

**ELLIOTT AVIATION** applies a creative paint scheme to this King Air 350 air ambulance operated by New Zealand based Starship Foundation.

**COMMERCIAL/MRO**

**FEDEX EXPRESS INDIANAPOLIS** CREATES EFFICIENCY THROUGH COMMON SENSE

**PAGE 26**

**GENERAL** AVIATION

**COMPOSITES TRAINING:** GETTING THE BASICS RIGHT

**PAGE 6**

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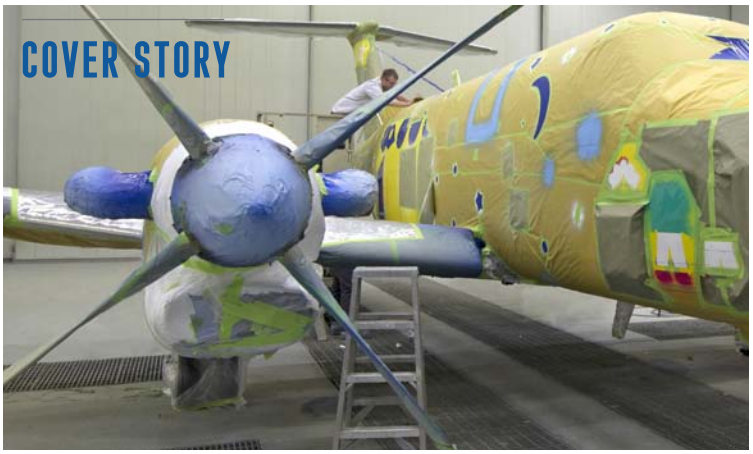
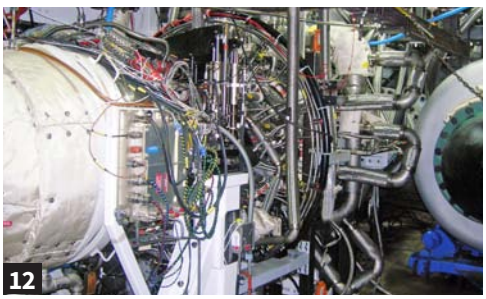
# CONTENTS: SEPTEMBER 2015






## FEATURES








## COLUMNS



## DEPARTMENTS



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# AIRCRAFT **COATINGS**

What's the industry saying about paint? *AMT* summarizes the results of our latest survey seeking information on the use of paints and coatings.

THERE ARE A LOT OF VERY COOL LOOKING AIRCRAFT out there today. Cool in the sense of paint scheme design and layout, and of course any array of attractive colors that seem to reach out and grab your attention as illustrated on this month's cover of *Aircraft Maintenance Technology*. According to Roy Block, Elliott Aviation paint shop manager, "Customers are seeking out high-quality paint jobs with fast turns." The requirement for eye-catching designs, great looking aircraft, and high quality paint services is supported by Randy Johnson, director of corporate aircraft services and paint shop manager at King Aerospace. Johnson says, "Customers are asking for VVIP level quality."

Cool looking designs and high-quality paint jobs begin well before the designer steps into the picture. High-quality paint jobs are a result of the talented people who actually paint the aircraft and the decisions they make when choosing products and equipment.

What are paint shops, painters, and maintainers looking for when it comes to aircraft coatings? In this issue of *AMT*, senior editor Barb Zuehlke took a look and summarized the survey results for you. She also provides some trends seen by a couple organizations that are heavily involved in painting aircraft.

This month's issue of *AMT* also takes a look at some of the challenges today with training composite repair technicians. Louis C. Dorworth with Abaris Training Resources talks about the *Metal Mindset* seen with training some of our industry's more experienced maintainers — maintainers accustomed to working on aircraft constructed with traditional aluminum materials.

Also on the topic of composite materials Pete Bunce, president of the General Aviation Manufacturers Association, takes a look at the latest use of composite materials today from a design and construction safety perspective. Pete describes some of the efforts underway to better understand how composite structures react in emergency landing scenarios.

For the ultimate airline line-maintenance experience, Tim Kern visited the FedEx Express maintenance facility in Indianapolis, IN. Tim looked at how FedEx Express took a common-sense approach to creating efficiencies in this Midwest facility. What began as a time study in 2007, looking at time spent by mechanics chasing tools, parts, and all the necessary items to safely maintain their company's freighters, resulted in dedicated work carts for nearly all routine tasks the maintenance group accomplishes. Another result was the information challenge. Each FedEx Express technician at IND was issued an iPad and all information required to do their jobs is available using it — no more paper.

Enjoy the September issue, Ron

**AMT AIRCRAFT MAINTENANCE TECHNOLOGY**

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# COMPOSITES TRAINING: GETTING THE BASICS RIGHT

For all our fascination with new composites fabrication and repair machinery — such as hot bonders that better document, display, and integrate complex processes — getting the basics of the composites craft right still matters

*By Jerome Greer Chandler*

In training entry-level composites technicians the challenge is to instill good habits; in bringing on experienced workers the trick is to break some already ingrained habits, habits that have been rendered bad with the advent of new technology.

Consider for a moment ply orientation and proper cure cycles, critical items when it comes to getting the most out of a composite repair. "In the past … equipment wasn't as smart as it is today," says Louis C. Dorworth, division manager for direct services at Abaris Training Resources, Reno, NV. Dorworth's knowledge base goes back a bit, to a time when analog technology reigned. He was on the ground floor for the flowering of the digital era. Back then he says — partially as a consequence of that relative technology deficit — "We had less information about repairs. Therefore, we had the risk of having a repair that didn't perform well." Resins and fiber orientation are good cases-in-point. Their properties "may not have been as well monitored" as they are today.

Among the habits that have to be trained into older technicians:

• *Exact fiber orientation.* The Abaris official says it's critical fibers be "oriented on axis at *each* level of the repair … so that it's aligned with each layer of the structure." In the past he contends the mindset was, 'It doesn't matter if it's off five degrees or 10 degrees … just get close.' That attitude won't fly, not anymore. "You want to be right on the money … within a couple of degrees. And there's a lot of care taken to make sure that happens;"

• *Ensuring the cure.* Dorworth says the old analog gear, the past tense approach, employed just

**ABARIS PROVIDES** composite repair training for general and business aviation technicians as well as those working in the airline segment.

ABARIS TRAINING RESOURCES

one or two thermocouples. "They'd be monitoring selected sites on the repair area," sites "where the data may or may not be accurate." If the technician used heat lamps, some areas might be hot, others not. Afterall, "Getting the full temperature *across* the entire repair" is the ultimate aim. That means deploying more thermocouples, something some experienced hands may not be accustomed to doing;

• *Mixing the resins right.* Dorworth says if you're dealing with a wet resin repair, it takes more "care, detail, and accuracy" to ensure the mix is right.

## THE METAL MINDSET

Some older technicians aren't the only folks with habits which no longer work well. Take metal workers, young or old. "A good metal guy," uses a die grinder in a fundamentally different way than a good composites technician. They "go in with the *leading* edge," says Dorworth. As a consequence "they tend to really take off a lot of material with

**STUDENTS PRACTICE** scarf repair preparation on a carbon graphite panel.
ABARIS TRAINING RESOURCES

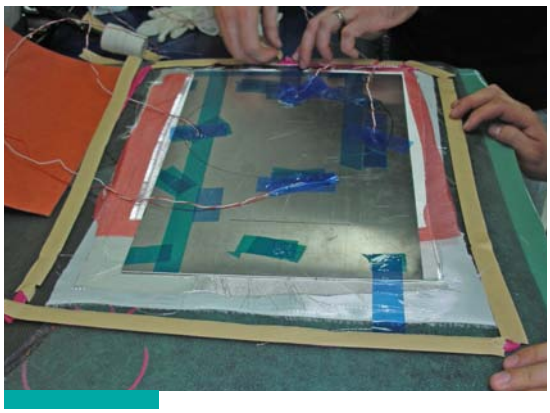
each pass. Well, if you take that same approach with that same tool to a composite you'll dig into that composite and destroy it within seconds."

Good composite training courses are especially keen to make this distinction, stressing the importance of working with the *trailing* edge of the die grinder so as to delicately "feather" the materials. In this case, at Abaris, the introductory learning material is plywood.

That basic skill imparted, Dorworth says the metal guys are "ready to move on to the next level," to feather around the damage removal area of the actual composite structure. Results come surprisingly quickly. "Over a couple of days of practice these guys [progress] from a pretty poor scarf angle of removal to a very well done [one]."

Why so fast? Remember, these people are A&Ps, die grinders are far from alien to them. Dorworth says, "They're just having to learn

**TRAINING COURSES** need to stress the importance of working with a die grinder so as to delicately "feather" the materials.
ABARIS TRAINING RESOURCES



**STUDENTS LEARN** proper installation of thermocouples on a caul plate.
ABARIS TRAINING RESOURCES

"As a Hawker operator I have experienced firsthand the level of expertise needed for Hawker maintenance is hard to find. I heard from other operators that Elliott Aviation consistently delivers high-quality maintenance, and I had to find out for myself. Elliott not only lived up to their history and excellent reputation, but the highly-trained and highly-skilled crew went above and beyond my expectations. After having the opportunity to actually sit down and talk with one of Elliott's Hawker technicians, I knew they were the right company to work on our aircraft. I continue to visit Elliott Aviation for my Hawker needs because the level of expertise is exceptional. Elliott consistently delivers our Hawkers squawk free, on time and on budget."

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**WITH DAMAGE** removed the repair layout begins.
ABARIS TRAINING RESOURCES

how to [work with it] "in a different manner."

Overall, the Abaris executive says, "There are plenty of old dogs who are willing to learn new tricks."

## TAKING IT FROM THE BEGINNING

Getting younger composites students to train up on next-generation digital gear "is the easy part," says Dorworth. "Getting them to actually be competent with their hands is our biggest challenge." Teaching them the basics of measuring and using calipers, employing a 12-inch scale to lay out a grid, getting them to measure out ply locations, "those are the kinds of things that they're lacking," he says. "It goes back to our school system … Kids are coming out of school without basic skills to do those kinds of things."

Enter the technical college, places such as South Seattle College and Wisconsin Indianhead Technical College.

Dorworth says South Seattle has a one-year STEM-Bridge program that focuses on *s*cience, *t*echnology, *e*ngineering, and *m*ath). The effort lays out the technical foundation upon which composites careers are constructed. "They become competent in all these basic skills." Students also get "a basic understanding of composite materials" such that they're able to enter into composites training entities such as Abaris "at a higher level … without us having to teach them all the basics."

Across the country at Wisconsin Indianhead Technical College (WITC) in northwestern Wisconsin, they're innovating too. While South Seattle College serves to help funnel graduates, ultimately, to aerospace firms in the Pacific Northwest, WITC's composites effort was initially started to support start-up Kestrel Aircraft, says Dave Crockett, head of WITC's composite technology program. He says, "The program quickly expanded to support Cirrus Aircraft" as well as MRO giant AAR, both in Duluth.

WITC teaches the basics of composite fabrication and repair for aircraft, wind turbine blades, and boats.


**WITC TEACHES** using donated aircraft fuselages.
WISCONSIN INDIANHEAD TECHNICAL COLLEGE

In that sense, it's a generalist. "What the aircraft industry uses for repair procedures is actually very similar to what the wind turbine guys do," says Crockett. "So, my students know how to repair aircraft … repair a wind turbine blade, or a marine hull."

WITC can be as flexible as it needs to in its expanding composites curriculum. But what students are there for are jobs. And that means training aspiring technicians to specialize, specifically in aircraft. For example, nearby Cirrus has "very specific repair procedures, per their SRMs." WITC teaches would-be composite technicians how to read the OEM's specific structural repair manuals.

That flexibility extends to the kinds of courses and certifications WITC offers. Crockett says WITC recently received approval for a curriculum that meets a number of needs, both those of industry and students. The previous program provided just a two-year associates degree.

"Because we realize some students don't want a full two-year associate degree, we now break the program in to an associates degree, the technical degree," says Crockett. "And then we hand out certifications. Students just want to come and learn [repair], they get what we would call a 'repair certification.' They take one semester of courses. And if they want to get a 'fabrication certification,' then they take two semesters. Fabrication actually includes a repair certification."

As with the composites themselves the hands-on, structured course work itself is layered.

How's the industry reacting to WITC's multi-level approach?

"Very favorably," asserts Crockett. "All students of our recent graduating class were hired by a local aircraft company and AAR."

Others are working first as interns. So satisfied has AAR been that Crockett says the MRO is "now funding half of our marketing costs for our composites program. *That's* how interested they are in it." **AMT**

**JEROME GREER CHANDLER** is a two-time winner in the Aerospace Journalist of the Year competition's Best Maintenance Submission category; he won in 2000 and 2008. His best-seller 'Fire and Rain' chronicles the wind shear crash of Delta Flight 191 at DFW. Chandler's passion for aviation safety is more than professional. It's personal. Two of his relatives have perished on commercial airliners, one of them in the infamous Braniff Electra crash of 1959.


# GE AND AIR FORCE UNVEIL THE

The "adaptive cycle" engine on the ultimate flying machine can automatically switch between the raw power of a fighter jet and slower, but more efficient flight desired by civilian airlines

The first jet engine used by the U.S. military was the result of a top secret project that took place in GE labs. Seven decades later, the Air Force is working with GE Aviation on the ultimate flying machine, and this time the partners are willing to talk about it. The "adaptive cycle" engine, as they call it, can automatically switch between the raw power of a fighter jet and slower, but more efficient flight desired by civilian airlines.

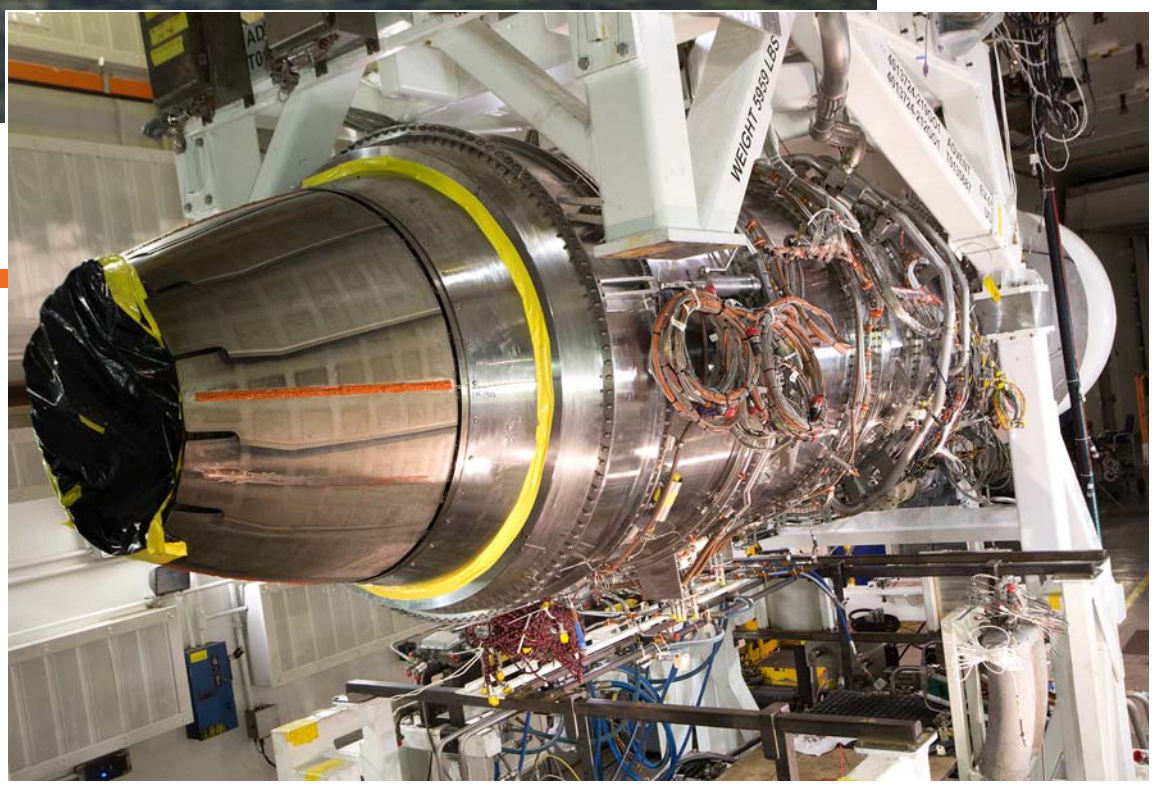
By marrying this adaptive architecture with a high-performance, heat-resistant core, this engine could achieve 10 percent higher thrust, 25 percent better fuel consumption, and 30 percent longer range, compared to the world's most advanced military jet engines operating around the world today.

"To put it simply, the adaptive cycle engine is a new architecture that takes the best of a commercial engine and combines it with the best of a fighter engine," says Jed Cox, who leads the Adaptive Versatile Engine Technology (ADVENT) project for the U.S. Air Force Research Lab. "So when I need high thrust, I can get high thrust. But when I don't need high thrust, I can move into a super-fuel-efficient mode."

Dave Jeffcoat, GE's ADVENT project manager, says the design will "optimize the performance" of the engine for every part of the pilot's mission. "We vary the pressure and bypass ratios mid-flight," he says. "In takeoff conditions, the engine operates like a conventional fighter aircraft in a high-pressure ratio, low-bypass mode, allowing pilots to maximize thrust. But during cruise or loiter conditions, you don't need that thrust, so we can transition to a high-bypass ratio, low-pressure ratio mode to be fuel efficient like a commercial engine. This adaptive feature of the design will deliver unprecedented performance capabilities to the Department of Defense," he says.

# ULTIMATE FLYING MACHINE

**GE HAS** been making jet engines for U.S. military since 1941, including the F110 engine for the F-16. This F-16 Fighting Falcon is from the 80th Fighter Squadron, Kunsan Air Base, Republic of Korea.
U.S. AIR FORCE/STAFF SGT. NICK WILSON




**THE ADAPTIVE** cycle engine is a new architecture that takes the best of a commercial engine and combines it with the best of a fighter engine.
GE REPORTS

**THE ADAPTIVE** cycle engine could achieve 10 percent higher thrust, 25 percent better fuel consumption, and 30 percent longer range.
GE REPORTS

**THE U.S.** Air Force reviews ADVENT engine parts.
GE REPORTS

"There have only been a few **major leaps of this kind of change** in the history of jet engine development."
*— David Tweedie, Manager of GE's Adaptive Cycle Engineering Programs*

The new design combines this "adaptability" with an additional source of air, called a "third stream of cooled air," that can be used to further increase thrust, improve fuel efficiency, and dramatically reduce the amount of heat the aircraft has to handle.

That's because the design, which was recently reviewed by propulsion experts from Lockheed Martin, Navy and NASA — in addition the Air Force and GE, includes the industry's most expansive-ever use of heat-resistant materials called ceramic matrix composites, including the first rotating ceramic matrix composite parts in the turbine.

"There have only been a few major leaps of this kind of change in the history of jet engine development," says David Tweedie, manager of GE's adaptive cycle engineering programs. "There was the leap from piston engines to turbojets, there was the leap from turbojets to turbofans. Now we're making the leap from a conventional fixed cycle turbofan to a three-stream, adaptive cycle engine. We're working with the Air Force to set the architecture and enabling technologies that will be critical to the warfighter for the next 20, 30, or 40 years."

Matt Meininger, the Air Force Research Lab's manager of adaptive cycle programs such as ADVENT and AETD says his team was "very proud of the partnership we've established with GE. In this case, it has developed a significant amount of trust and respect in the relationship, so we end up with a better product that's going to allow for better defense of our country." **AMT**

*This article is courtesy of GE Reports, www.gereports.com.*

# SHERWIN-WILLIAMS JETFLEX® ELITE BRINGS FIRST CLASS TO INTERIOR AIRCRAFT COATINGS


Designed to create a softer, richer atmosphere within the aircraft cabin, JETFLEX® Elite from Sherwin-Williams Aerospace Coatings is a single stage coating, based on OEM qualified material that is ideal for commercial and private aircraft interiors.

Using an interior cabin coating like JETFLEX Elite is a cost effective way to improve the passenger experience in the economy or premium class sections of the aircraft.

It offers an extensive color palette from bright whites and neutrals to vibrant effects while providing outstanding stain, high abrasion and scratch resistance.

JETFLEX Elite is an interior cabin coating product designed to offer sophistication and mood enhancement to aircraft interiors. Using proprietary pigments that are more responsive to LED lighting, these coatings create a subtle glow with highlights and colored shadows not seen with current interior cabin coatings. Color tones have been derived and inspired from Sherwin-Williams' most popular interior architectural lines.

Sherwin-Williams JETFLEX® Elite is recommended for interior applications and applies easily to plastic, metal and composite surfaces. Based off Boeing Qualified technology (BMS 10-83), it meets the most stringent requirements for stain and abrasion resistance as well as the FAR / JAR 25.853 regulations for burn, smoke and heat release. Being a single stage coating, it does not need a clearcoat, yet provides extensive durability against scratches, stains and mars.

**NEED AEROSPACE COATINGS? ASK SHERWIN-WILLIAMS**

Sherwin-Williams Aerospace Coatings provides a variety of topcoat and primer cabin coatings systems designed to provide a smooth, textured or soft feel finish. It also offers a variety of aerospace primer products specifically designed for aircraft interiors. These primers complement Sherwin-Williams interior aircraft topcoats by assisting with substrate adhesion and hiding profile and surface imperfections.

Today's aviation coatings specifiers and painters ask Sherwin-Williams Aerospace Coatings to provide quality coating systems and technical support to the global commercial, military, general and business aviation markets. Sherwin-Williams is an industry leader in innovation and technology solutions with its certified products, top-rated service and knowledgeable team of field technicians.

For more information on qualified interior cabin coatings, go to www.swaerospace.com or call Sherwin-Williams Aerospace Coatings 1.888.888.5593 (North America), 1.316.733.7576 (international).

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# **PAINT:** WHAT IS IMPORTANT TO THE AIRCRAFT MAINTENANCE INDUSTRY?

*AMT* takes a look at the trends and technology concerning paint and painting services

*By Barb Zuehlke*

*AMT* CONDUCTED A SURVEY IN DECEMBER seeking information on the use of paints and coatings to know what products you use and why.

Of the respondents, 41 percent said they paint aircraft, while 33 percent said they paint aircraft parts and components. Breaking it into industry segments, general aviation was 42 percent; business jets 18 percent, helicopters 18 percent, military 11 percent, and commercial aviation 11 percent. And the largest category of aircraft painted annually was under 25 at 67 percent, followed by between 26 to 50 at 12 percent, none at 12 percent, between 51 to 100 at 5 percent, and more than 100 at 4 percent.

## WHAT ARE MAINTAINERS LOOKING FOR WHEN IT COMES TO PAINT?

The selection criteria went like this: first durability, followed by color match, customer support, repairability, quick delivery, custom color matching capabilities, price, locally available (within 50 miles), productivity/fast drying, OEM qualifications, environmental benefits, and training.

Comments from technicians as to what the most important brand characteristic is included: "durability and vendor access," "reliable and repeatable color match;" "ease of application;" "quality, performance, and warranty;" "one coat covering;" "quality and customer service;" "good adherence so it doesn't chip;" "holds up to extensive washing;" "buying paint in the States and not having to pay hazardous shipping fees from Europe;" "easy to use and fluid resistance and great gloss;" and "long-lasting shine."

The durability characteristic also came up most often when asked about the primary aircraft coating system used. Other comments included ease of use, price, matchability, availability, repeatable performance in varying conditions, color selec-

PHOTO COURTESY OF ELLIOTT AVIATION

tion, fast drying, safe to environment, quality, and UV resistant.

### WHAT DO YOU WISH YOUR PRESENT COATING BRAND DID BETTER?

The majority of the respondents said faster dry times (36 percent). Other characteristics were improved quality (20 percent), more coating choices (22 percent), and more color options (20 percent). In terms of service options, the most requested was more hands-on assistance (30 percent), better training (26 percent), and faster delivery (23 percent).

Comments from technicians as to what their current brand could do better included: "longer shelf life," "cost is still an issue," "quicker cure time and better adhesion," "color matching from order to order," "better tips on spray cans used for touchups," "faster drying times," "wish the mixing/prep was less complicated," "could be more UV resistant or fade resistant," and "nothing, because the distributor is very knowledgeable on the product they are selling and in helping solve problems when spraying."

The survey also asked what your present coatings brand could offer in terms of product line. The majority requested faster dry times (36 percent), improved quality (20 percent), more coatings choices (16 percent), and more color options (15 percent).

As for service options, more hands-on technical assistance ranked first (30 percent), followed by better training (26 percent), faster delivery (23 percent), and more frequent rep face time (11 percent).

Painting an aircraft is part of the maintenance required; it prevents corrosion. A typical paint job protects an aircraft for about six years for jets and six to eight years for turboprops. *AMT* talked to a few companies that specialize in business aircraft coatings; read what they have to say about trends in the industry and what customers are demanding.

## SHERWIN-WILLIAMS LISTENS TO THE INDUSTRY

Sherwin-Williams Aerospace Coatings, based in Andover, KS, has been providing quality coating systems and technical support to the global commercial, military, general and business aviation markets for more than 80 years. Today, its global footprint continues to grow with sales and distribution in more than 100 countries.

### WHAT TRENDS ARE YOU SEEING IN THE AVIATION PAINT MARKET?

"Customers are really looking for increased production times," says Julie Voison. global product manager at Sherwin-Williams Aerospace Coatings. "Whether from a primer that gives them the ability to get the topcoat down sooner (like our CM0480930 Exterior Composite Surfacer), or being able to spray multiple colors faster which is assisted by the advent of basecoat/clearcoat systems like our SKYscapes. AMS 3095 certified SKYscapes offers longer recoat times which means

KING AEROSPACE/SHERWIN-WILLIAMS

less or no sanding between colors. The result is faster processing time and turning around more jobs.

"When it comes to the personal and business jet audience," she continues, "we're also seeing MROs asking for more colors with metallics, micas and sometimes even a blend of them for their customers. Remember with this audience, you have a range of people who want to make a statement or be bold with their aircraft; whereas others want to stay elegant, but rather anonymous. As a result, through unique striping design schemes and other paint details, a stellar paint job can be achieved for both."

### WHAT ARE CUSTOMERS ASKING FOR?

Sherwin-Williams is seeing a large increase in OEMs and repaints asking for interior cabin coatings that can cost-effectively improve the passenger experience in both economy and premium sections of the aircraft. "To help meet this challenge, we've introduced JETFLEX Elite polyurethane enamel, an interior cabin coating product designed to offer subtle sophistication and mood enhancement to aircraft interiors," Voisin says. "By using specially selected pigments that are more responsive to LED lighting, we can provide coatings that create a subtle glow with highlights and colored shadows not seen with current interior cabin coatings.

"Another request from our painters," according to Voisin, "was to provide faster, better access to color retrieval. So we recently introduced the Sky Match Color Management System. It provides simple to use color searches, storing, tracking and reporting; with all the information readily available, 24/7, 365 days a year." Sky Match provides improved profitability, as painters can now make the specific batch size needed, less product waste, and with its custom matching capability, improved productivity and better inventory management, Voisin says.

### WHAT TYPES OF TRAINING DO YOU OFFER TO KEEP TECHNICIANS UP TO DATE?

Sherwin-Williams holds regular training courses at its aerospace headquarters in Andover (Wichita) KS, and provides hands-on application training in the latest coating system technologies including surface preparation on multiple substrates, topcoats, clears and repairs. "We have regular painting curriculums," Voisin says, "but most every course is custom designed for the painter, whether novice or more experienced, depending upon their particular needs."

## KING AEROSPACE

*AMT* talked to Randy Johnson, director of corporate aircraft services and paint shop manager at King Aerospace in Ardmore, OK. For over 20 years, King Aerospace has been providing aviation services on a global basis to operators of VVIP aircraft, corporate aircraft and government aircraft. Headquartered in Addison, TX, it employs 75 and 40 of those are in the paint shop, according to Johnson.

### WHAT THE CUSTOMER WANTS

"Customers are asking for VVIP level quality and from what we hear no one is offering it," Johnson says. "We're a quality-based company and are looking to specialize in this area. It takes a little more and costs a little more but it is what the industry is asking for."

King Aerospace mandates that all of its employees share in the company's principles

and values. Its mission: "Make a positive difference in the lives of those we employ, we serve and encounter and earn a fair profit."

King Aerospace defines its culture of inclusion as including mutual respect; honesty and trust; non-political environment; team oriented; demonstrated performance; proactive, problem-solving attitudes; quality in everything, (no excuses); and earn a fair profit.

"And we live them," Johnson says, "it's a good work environment." And to prove the point he's been at King Aerospace for 21 years.

## FACILITY UPGRADES

Last June the company upgraded its facility and moved the paint booth into the facility. "That's worked out real nice," says Johnson.

> "Customers are asking for **chrome-free primers** as they are more environmentally friendly."
> *— Randy Johnson, King Aerospace*

"The new facility can handle a 757 or a BBJ." The 757 takes 55 days to complete a paint job while a corporate jet takes 45 days, he says.

"Customers are leaning on us," he says. "We're talking about adding a second booth so we could fit two large aircraft at the same time. We can't accommodate all the people that want the work done."

Currently the company is capable of handling as many as 50 corporate jets annually.

## TRENDS

"Customers are asking for chrome-free primers as they are more environmentally friendly," Johnson says. "And it cuts the metal treatment process. We've used Sherwin-Williams on our last two large aircraft. We use Graco Pro X electrostatic spraying equipment."

The change to electrostatic spraying equipment has been beneficial to the overall quality over the previous HVLP equipment, Johnson claims.

## EXPERIENCE

The average number of years of experience for technicians is 15 to 16 years, according to Johnson. "We have some with up to 30 years experience. Three years is the minimum and they're working their way up."

Like many maintenance facilities there are open positions; a recruit would need five years minimum to be hired, Johnson says. There is on the job training for specific airframes, although the processes are the same for VVIP and corporate aircraft.

## ELLIOTT AVIATION

Elliott Aviation is a diversified aviation services company with three Midwest locations in Minneapolis, MN; Des Moines, IA; and Moline, IL. Known as a world-class provider of comprehensive and customer-focused solutions for business aviation, it is a second-generation, family-owned business. It has been providing aircraft sales, aviation services, and innovative solutions since 1936.

According to its mission statement, "Whether you are a customer or employee, when you work with Elliott Aviation, you are part of our family and we will treat you with honesty and integrity. We promise to deliver excellence to our customers, treat your aircraft as if it were our own, and strive to do the right thing every time."

Part of Elliott's customer service is utilizing EnVision technology to give clients a preview of the finished product through 3-D modeling. The system has thousands of options for interior refurbishment and paint applications, allowing customers to see the exterior paint scheme with graphics and logos in place.

### WHAT THE CUSTOMER WANTS

"While in the past, business aviation has been standard Matterhorn White with two metallic stripes," says Roy Block, Elliott Aviation paint shop manager, "we have been seeing more unique paint jobs lately. Customers are seeking out high-quality paint jobs with fast turns. We are also seeing customers looking for longer paint warranties."

### FACILITY UPGRADES

"When we built our paint facility in 2007, we led the industry as one of the only climate-controlled, down-draft facilities in the country," Block says. "That construction was so far ahead of its time, that since then the only improvement we have needed to make was to add electrostatic paint guns, which we did in January of this year.

"The switch to electrostatic paint guns has been a great change for our team," he continues. "They take a little getting used to but once you have been using them after just a few hours, you start to see how big a difference they make."

> "Customers are seeking out high-quality paint jobs with **fast turns and longer paint warranties**."
>
> *— Roy Block, Elliott Aviation*

Depending on the sizes of aircraft that go through the facility, Elliott Aviation can handle about 60 slots per year.

## TRENDS

"There are a lot of newer technologies emerging centered around painting aircraft," Block says. "One that we are seeing is the move toward the use of electrostatic guns. Although they are significantly more expensive than traditional paint guns, they help eliminate high and low spots to ensure an even mill thickness. They also significantly reduce overspray."

It is also seeing an increase in demand for Mica paints, which are basically alternate versions of metallic paints and used in many applications where traditional metallic finishes are not an option. Elliott Aviation is investing in more chrome-free and low chrome coatings. These coatings are much better for the environment, easier for disposal, and contribute to a better air quality within the facility.

**FALCON 900EX** being painted at Elliott Aviation's Moline, IL, facility.
ELLIOTT AVIATION

## EXPERIENCE

Currently Elliott has about 25 paint technicians, and many have over 20 years of experience. Block has 23 years of aircraft painting experience, starting with his father's aircraft painting business in east central Iowa where he worked for 10 years painting light aircraft. He will soon be celebrating his 13th year with Elliott Aviation where he began as a second-shift paint technician, advancing to team leader, supervisor, and now paint shop manager. **AMT**

# RECOGNITION MATTERS —

## Be sure to read *AMT*'s November/December issue

*Aircraft Maintenance Technology (AMT)* magazine's November/December issue will recognize 40 individuals under 40 years of age from the aircraft maintenance industry for their contributions to the industry and a "job well done." It is not a ranking, but rather a listing of individuals who have shown initiative, a capacity, or have made an impact to the aviation maintenance industry.

Whether you work in general aviation, business aviation, airlines, MRO, rotorcraft, military, or education, *AMT* will acknowledge you or your colleagues for dedication to the aviation industry.

Criteria for selection included such things as job commitment, industry involvement and contribution, achievement in his or her position and innovation in his or her field. While no candidate may possess all criteria, we are looking to reward those who deserve recognition for their efforts.

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FEDEX EXPRESS

# FEDEX EXPRESS INDIANAPOLIS **CREATES EFFICIENCY** THROUGH COMMON SENSE

The key to efficiency — FedEx Express runs a lean operation, and it doesn't have a lot of "extra" airplanes or parts — is to assess problems early, be ready with the necessary maintenance, and to stay ahead of trouble

*By Tim Kern*

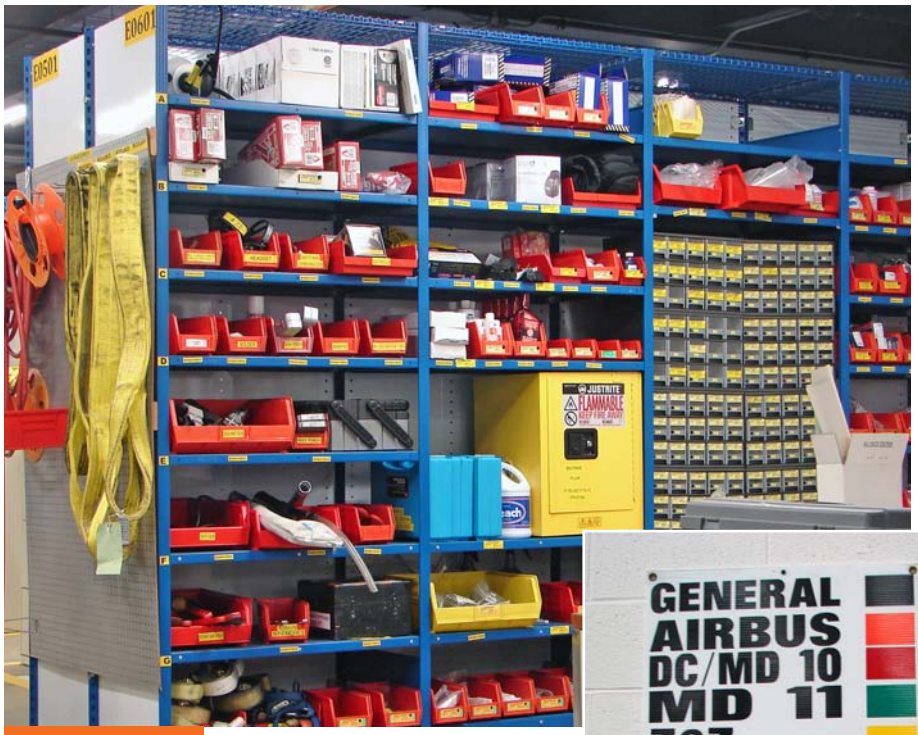
THE FEDEX EXPRESS MAINTENANCE FACILITIES in Indianapolis (IND) are just like any other jet home, except for a few things. Well, a lot of things; but the principles are the same, and the sheer scale of the operation and the airplanes mandates efficiencies and innovation that can scale down, all the way to the one-man shop.

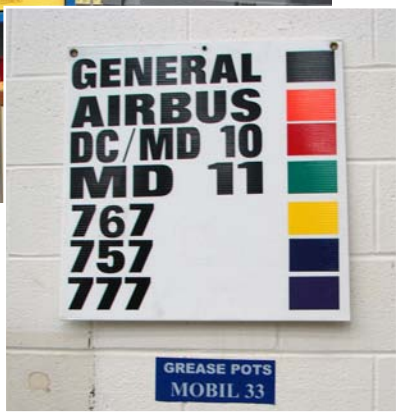
Most of the FedEx Express fleet of MD-10 and -11 freighters, Airbus 300 and 310, and Boeing 757, 767, and 777 can receive light maintenance and the occasional repair; B-checks are routinely performed on all but the MD-11 and triple-sevens. Michael Sanford, senior manager, field line maintenance, IND Region, runs the East side hangar, where they do the quick turnarounds and routine maintenance (up to and including gear changeouts); Garry Lyons, senior manager, IND hangar maintenance, runs the West side, where the crew performs B-checks, repairs, and the occasional manufacture of parts. "Some of the MD-10 parts are becoming scarce," he notes.

With well over 100 mechanics, six managers, and a bit of administration on the East side and 250 on the West, the roughly 20 flights a day (and 65 per night) get a lot of attention; a typical 757 B-check takes 24 hours. (The MD models take longer; the 767, less time.) Since the aircraft are of varying ages and sport varied equipment, FedEx Express Indy has to be ready for everything. Cockpits are classic or glass; even airframes differ — a handful of the 767s have blended winglets, helpful in their earlier lives as airliners but a mixed bag as freighters that fly heavier and shorter routes. "They're another 12 feet of wingspan," notes Sanford, "and sometimes that's inconvenient on the ground." [Note: All but five of the current fleet of 767s were delivered as freighters, without winglets.]

**EVERY SHIFT** starts with a short meeting to coordinate and prioritize work.
TIM KERN

The key to efficiency — FedEx Express runs a lean operation, and it doesn't have a lot of "extra" airplanes or parts — is to assess problems early, be ready with the necessary maintenance, and to stay ahead of trouble. "The moment the airplane is tied down [the nose wheel is tethered until unloading and loading are complete], our crews are doing a walk-around and post-flight inspection. Of course, the flight crew will let us know of anything we'll need to look at, while still in the air," says Sanford. There is one more set of




**TOOL BINS** are color-coded to aircraft type. Tools and special parts are color-coded by type; easily spotted in the toolroom or across a hangar. TIM KERN

eyes: "Our mechanics also drive the tugs."

The day shift aircraft start arriving around 11 a.m., and they're out during afternoon rush hour; the night arrivals are timed about 12 hours the other side of the clock. Each shift starts with a "daily work release sheet" and brief meeting, where incoming work is noted, with priorities 0-4 (with zero meaning "now!"). The mechanics pick up tools, safety equipment, and supplies; they're ready as soon as they can get the airplanes.

Not everything at FedEx Express Indy is scalable. The facility has some giant equipment — gantry cranes, huge, tall forklifts, dedicated platforms for tail-mounted engine changes and maintenance (where the parts bins are already located, restocked and ready for the next job). The facility also has a composites shop, complete with air showers and a clean environment; paint and decals are ready any time maintenance or branding calls for them. FedEx Express is proud of the corporate image, to the point where it contracts crews to wax the planes. It takes 60 man-hours to clean a wide-body; that's typically six hours, with 10 people.

And here is where the FedEx Express systems start to be a big-scale model for any maintenance shop.

## FINDING EFFICIENCIES

Starting around 2007, "We did time studies," Lyons says, "and were astounded how much time mechanics spent, just walking back and forth, getting tools, parts, supplies, consumables. Literally miles a day. We want to run a 'lean' operation, and we can't waste time. Plus, it wears them out — for nothing." So it made a lot of changes. "Like any change, even if it's in the right direction, it takes a while for them to settle in. In our case, it took about a year; but now, nobody wants to go back [to the old ways]."

Since all mechanics are trained on all the models, each aircraft can be addressed as it needs attention. "We're always cross-training," says Sanford. Still, there are specialists: in avionics (17 positions) and structures (27). "The work there is just too specialized."

How to do more, with less: that's always a good question. The answer is in finding efficiencies. Having the tools, parts, and consumables ready, at the airplane saves time and shoe leather.

Picking and assigning tools is simplified through color-coding; each type's special tools follow a code, making spotting them easy. Dedicated carts — for common tasks, like gear changes — mount every tool needed for the job, from floor mats to creepers, to dedicated crow's foot end wrenches in the right sizes. They also have a small but handy selection of common hardware items — right-size bolts, nuts, and washers; safety wire; O-rings. The idea is that the mechanic will have everything he or she needs to complete the job, without interrupting work to fetch parts or tools. When the job is finished, the cart goes back to its station, where it is restocked.

A common problem in most shops is the use of consumables — shop towels come immediately to mind. When they are in short supply, things get dirty; when they are readily available, they can sometimes migrate to home garages. Some shops require a cloth, for instance, to be turned in to get a new one issued; paper wipes, though, cannot be accounted for this way. And the mechanic waits while the toolroom guy does the dispensing. FedEx Express is soon to implement "vending machines" where the mechanic

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TIM KERN


simply swipes his card, and the consumable pops out. No waiting, and over-use is flagged. "We're going to see how that works," says Lyons.

"We've kitted over 1,500 rotable parts. When a mechanic goes to, say, replace a starter, they don't have just that starter; they have the clamps, O-rings, tools — everything they need to do the job. It's made a huge difference in lowering frustration, in saving time," adds Greg Hall, senior vice president, air safety and business operations, FedEx Express.

The dedicated tool carts have expanded efficiency. They're shop-built, to specifications derived from the mechanics' requests. "If they design it, they'll use it," says Sanford, who notes that the cart program is extremely popular. "They really help to get the tools, the mechanic, and the plane together, and to keep them together until the job is done."

Lyons notes that the carts, built to a common design but specialized for the tasks, are not cheap. "They're actually fairly expensive to build; they're all steel. We tried PVC and some other approaches, but the good carts do the job." Then he discovered something else. "Even with top-quality components, the carts need maintenance, too." So the carts are on a regular preventive maintenance program.

And in some ways, FedEx Express Indy isn't everyman's shop. It has sophisticated CNC and manual machine tools, two engineers, and five machinists.

## IT IS A TOOL

While it's great to have all the parts and tools necessary for a specific task within reach on a cart, it's also important to perform each task properly. FedEx Express mechanics don't use paper manuals. Everything they need is available on their issued iPads — current and correct. And communicable across facilities, so that one mechanic in, say Los Angeles can help a mechanic in Indy. They can exchange videos, photos, and personal knowledge.

Scot Struminger, vice president, information technology, FedEx Express, notes that with the iPad, "You can look at the MEL; if you haven't done something before, you can even look at a short video, right there. Not only are we training in the classroom, we have visual aids for just about any task you can think of. And visual aids are much more powerful than the written word. That keeps us more efficient while staying within the guidelines and regulations.

"Written instructions are great, but when you have a visual, you can do it more easily," Struminger says. "They still read the manual for detail, but the videos — and Face Time for Mac — help our technicians communicate with engineers and supervisors. So a guy in Indy can contact a specialist in LA, for instance, at all our service stations, where a number of techs are trained to be specialists — Dallas and Atlanta specialize in engine changes; LAX handles that for the MD-10 and -11. We have specialists on fuel quantity in Atlanta — any tech across the system can get immediate specialist support across the system.

"A journey like this is so interesting. iPads and mobile tech weren't what we were after when we started; but in the middle of it, it became clear that mobile was what we needed to do; so because of the flexible project plan, we kept our eyes on the goal and entertained new ideas on the way. We created a system that can manage the fleet from anywhere in the world.

"It was a joint exercise between the IT folks and A&Ps, so the IT folks could understand and work with A&Ps," Struminger says. "We didn't build things based on IT; our ideas came from the front lines. Greg and I sometimes couldn't tell who was the IT person and who was the A&P."

Still, as with any major shift, Hall notes that "It took a bit of getting used to, going with an iPad instead of a computer."

But Struminger had an idea, and may have coined a new B-school term: Forced adoption. The concept is easy, he says: "Once the new system is in operation, you turn off the old one. You have to, or you'll end up with parallel systems. We didn't want to see green-screens. And we don't."

## INDIANAPOLIS IS A POPULAR CENTER

FedEx Express looks for employees internally first, based on seniority. "We get probably 20 bidders for each opening," says Lyons. "Indy is a popular place to work."

But while that system leads to an experienced workforce, Sanford notes that "the average age of our mechanics is around 50; our youngest is 39."

But that pipeline needs to be filled. To that end, FedEx Express has two programs. "We have a maintenance training program," says Sanford, "for A&Ps with under three years' experience. It's a three-year program, working with our most-experienced mechanics." Graduates are instantly assimilated into its facilities across the country.

Younger, less, experienced but enthusiastic students at Vincennes University are starting with FedEx Express Indy in a new program, where three students, recommended by the school, are in paid internships at the Indy facility. "We see three students for three months, and we have three rotations per year," explains Sanford. "They rotate through shifts and lines, and gain a lot of experience." He adds, "It's a great resume-builder."

It all comes together: the lean structure, ongoing training, adoption of ideas from the people who live with them. Senior Vice President Hall sums up: "We believe that everything we do should lead to a safer, more pleasant, more efficient environment. The quality of work is better and more efficient than ever before. We pride ourselves on service, but we also price ourselves on safety. I can't begin to tell you how proud we are of our workforce, our team." **AMT**

# WHY INSPECTION AUTHORIZATION RENEWAL SEMINARS ARE VALUABLE

Great seminars recharge the spirit, remind IAs of the importance of their authority, and reinforce the safe attitude critical to their job

*by Dr. Bill Johnson*

During August 2015, I was "hanging out" at the local airport in Andrews, NC, (Western Carolina Regional Airport). Actually, I was getting some overdue refresher training and a biannual flight review. My currency had a multi-year, multi-decade lapse. Thus, I felt a bit like a new student, especially around the GPS avionics. Yes, I did get the renewal and have resumed my monthly tithing to general aviation.

As you might expect, it did not take long to start talking about maintenance. Conversations were classic GA. We talked about reciprocating engines, spectrographic oil analysis, density altitude, and annual inspections. We did not use words or phrases like hot section, blade clearance, or vibration monitoring. We were not very far into the conversation when Mark Edmonds, assistant airport manager, commented that he had "seen me somewhere before." As soon as I mentioned IA seminars and my FAA affiliation (my cover was blown) he recalled an IA seminar held at Richard Childress Racing (RCR) facility in Lexington, NC. He was working for Compass Aviation, Shelby, NC, at that time in 2012-13. We both recalled the event.

Mark Edmonds and I proceeded with a few stories and laughs. I asked him what he recalled about the class. Most of the discussion was serious.

**DR. WILLIAM B. JOHNSON** is the FAA Chief Scientific and Technical Advisor for Human Factors in Aircraft Maintenance Systems. His comments are based on nearly 50 years of combined experience as a pilot/mechanic, an airline engineering and MRO consultant, a professor, and an FAA scientific executive.

## 1 THE CARS

We both recalled the presence of some tricked-out RCR NASCAR wining cars. The NASCAR precision, expertise, and attention to safety mirrored the attitude, skill, and behavior of the AMT/IAs in the room. Many of the IAs were responsible for the safe air transportation of crews, drivers, and families to racing events across the country. NASCAR team owners respected their maintenance team, at the track and at the hangar.

## 2 THE HUMAN FACTORS WOMAN

At the time of that IA renewal I was relying on the newly produced series of human factors videos. There are 11 short human factors topical videos, still available on the FAA website www.humanfactorsinfo.gov. They are part of the Maintenance Human Factors Training System. The videos are discussions between Bill Johnson and Dagmar Midcap. Midcap, then with an Atlanta television station and now with NBC in San Diego, was very memorable in her portrayal of a human factors expert. He recalled that the short snippets were educational and interesting. They were short enough to avoid boredom. The videos are easy to watch.

## 3 FATIGUE

Edmonds remembered the materials about fatigue. He remembered the fatigue video, Grounded, which is also on the FAA website and YouTube, of course. He recalled that Grounded was "not like most FAA training films." He was correct about that since most training productions do not win 18 international industrial video awards.

## 4 FAILURE TO USE TECHNICAL DOCUMENTATION

Mark Edmonds had some recollection that I talked about the topic of technical documentation. He acknowledged that it is an important

and relevant topic but did not recall that I delivered the "magic bullet" solution to the challenge. I do not recall that I offered a sure solution to this known industry hazard. I am uncertain of the best solution. However, that topic is a challenge that we continue to work on at FAA and throughout industry. (See *Aircraft Maintenance Technology*, August, September, October 2014).

## 5 THE PEAR TEST

I recalled the PEAR. Since it was at least four years from the IA seminar, I did not apply the Johnson PEAR Test (See *AMT* Magazine, February 2015). Many readers and IA attendees recall my theme that human factors can be categorized into four topics including: 1) the People (P) that do the work , 2) the Environment (E) in which they work, 3) the Actions (A) that they perform, and 4) the Resources (R) necessary to complete the job.

## 6 FAASAFETY.GOV

Mark Edmonds made Bill Johnson's day when he told me that the human factors presentation made him go to www.faasafety.gov and take human factors training from the Maintenance Hangar. He also found other courses of value and has since taken those as well. When IA renewal seminars motivate IAs to look at additional safety materials then it is a "mission accomplished" moment.

## 7 WHAT MAKES A GOOD IA SEMINAR?

We talked about why the Lexington, NC, seminar was a success. I believe that it has a lot to do with the experience and motivation of the organizers. The RCR IA seminar was organized by FAA Inspector Tim Quain, from the Greensboro, NC, Flight Standards District Office. His past life as maintenance director for NASCAR helped secure an excellent facility. Following in the tradition of Phil Randall, he knew that an IA seminar needed a great program and a great networking environment. That kind of gathering redefines aviation safety networking. It is equivalent to the Aviation Safety Action Program InfoShare, frequented by the 121 crowd.

The most important result of a great IA renewal seminar is hard to measure. It is intangible. Of course, there is new information presented and familiar information refreshed. Great seminars give IAs information to pass along to others at work. Great seminars recharge the spirit, remind IAs of the importance of their authority, and reinforce the safe attitude critical to their job.


**DR. BILL** Johnson at a Lexington, NC, IA seminar held at the Richard Childress Racing (RCR) facility.

Mark Edmonds commented that "A high value IA renewal seminar is about the quality of the speakers." "The audience is not too good about sitting in a chair all day", he said. It is important to have a variety of topics that mix technical issues, business issues, and even topics like human factors. Breaks and a nice lunch are critical to keep the male-dominated participants happy. We both remembered the North Carolina barbecue and sweet tea.

## 8 FROM THE TEACHER

Anyone who has participated in an IA renewal class learns something. They may learn from the presenters or from one another, at the coffee breaks. As a presenter I have always learned a lot. The Q&A sessions give me an applied perspective on the human factors topics. IAs are the most experienced of the entire aviation maintenance technician workforce.

In 2016 I plan to participate in some of the *AMTSociety* and *Aircraft Maintenance Technology* IA renewals. The organizer is Ron Donner, *AMT* editor. His Atlanta meeting, Jan. 8, 2916, is always a good one. As described above, Donner puts together excellent IA seminars. He finds a great convenient venue, lines up excellent speakers, has great vendor displays and door prizes, and good food. Other dates and locations: Denver on Jan. 22, 2016 and Kansas City on Feb. 10, 2016. ***AMT***

# STILL **A BUYERS' MARKET**

After Malaysian Airlines' and Air Asia's high-profile aircraft losses in 2014, many industry professionals thought aviation insurance rates would be forced upward. However, underwriters indicate the effect on general aviation insurance rates and availability will be minor ...

## GENERAL AVIATION MAINTENANCE MARKET REVIEW 2015

With most of 2015 behind us, many in the aviation insurance industry believe that pricing will remain low. As the year winds down, few increases and even some decreases in premium may be expected. Coupled with indicators for growth in the general aviation market, this gives an added boost to any aviation business looking to expand their operation.

A crowded aviation insurance marketplace continues to drive rates down. Despite a historic high of over 25 aviation insurers operating in the United States, not a single underwriter withdrew from aviation this year; this indicates that aviation insurers are surviving with smaller market shares than in the past. All of that is great news for buyers of aviation insurance who will enjoy more options and frequently see multiple underwriters quoting their business.

A crowded aviation insurance marketplace continues to drive rates down. Despite a historic high of over 25 aviation insurers operating in the United States, not a single underwriter withdrew from aviation this year.

## COMMERCIAL AVIATION

Insurance for general aviation commercial operators remains very competitive. Insurers continue to broaden their product offerings across more segments of commercial aviation, including maintenance operations.

Maintenance operations, charter, flight schools, and ground operations with no loss history are likely to receive flat renewals or single-digit rate decreases. Clients with recent claims are less likely to see their rates drop; however, we have not seen steep rate increases in these situations unless the loss was significantly large. MROs without losses are receiving flat renewals due to a narrow risk profile when compared to other commercial and charter operations. Overall, the higher incidents of loss in commercial aviation, compared to the corporate sector, has not seemed to affect insurance rates very much.

## SMALL "SINGLE MECHANIC" OPERATORS

Rates for small (less than 10 employees) maintenance shops have also decreased in the past year. In this market segment, rates are driven by 'class' loss performance rather than individual business loss performance. The good news for business owners in this segment: higher liability limits (which have always been hard to obtain in this sector) have become more readily available. When asking for renewal quotations be sure to ask your broker for higher limit options, they may be more affordable than you think.

## THE CUSTOMER WINS

In all market segments, overcapacity (a large number of underwriting companies) will continue to be the driving force. Unless a significant insurer departs or dramatic losses occur, rates will remain the same to the end of 2015. Insurers will become more competitive by lowering rates or increasing their services and policy offerings. As underwriters compete for business, the reduced premiums and expanded coverage will contribute to healthier bottom lines for your business. That is good news for everyone in the industry. **AMT**

**STEVE BRUSS** is president of Wings Insurance, an independent aviation insurance broker headquartered in Minneapolis, MN. Steve has 22 years' experience in aviation insurance, and is also a licensed Commercial pilot and flight instructor. He can be reached at sbruss@wingsinsurance.com or by calling (952) 641-3140; www.wingsinsurance.aero.


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# THE REALITY OF **SERVICE CULTURE**

Organizational culture is the unique blend of values and beliefs that define an organization. It is also the way we interact with one another, how we speak, and the attitudes and feelings we have about our company. Service culture is more specific than organizational culture, because everything relates back to customer service.

*By Bob Hobbi*

***"Culture eats strategy for breakfast."***
*— Peter Drucker*

**BOB HOBBI** is the founder, president, and CEO of ServiceElements International Inc. Bob has 30 plus years in aerospace and aviation leadership roles with FlightSafety International, Honeywell Aerospace's Aerospace Academy, and MedAire. ServiceElements is an organizational and people development company, now in the aerospace industry for almost 15 years. For more information visit www.ServiceElements.com.

The aviation industry has a long history of doing business on an international stage. Passengers, flight crews, maintenance techs, flight attendants, schedulers/dispatchers, and the people who work within the industry are from every corner of the earth. On any given day, an airport located in what might be considered even the remotest of locations will play host to international government officials who are flying with international flight crews who work for a multinational corporation.

It is, in fact, an assumption and expectation that those who work within aviation demonstrate an appreciation for and sensitivity to the cultural differences found among the people who populate the industry. But while employees and managers within aviation have an almost natural, implicit awareness of culture by virtue of the diverse constituency they serve, it is critical to highlight another culture — what is known as the organizational culture.

## WHAT IS ORGANIZATIONAL CULTURE?

In today's highly competitive and complex arena, organizational culture is not just a topic for company executives. Organizational culture influences every division and department, every executive, and every employee. To understand why, we simply need to ask "What is organizational culture?"

To better answer this question, think about an international customer who recently used your airport services. The customer came from another country that probably has different values, beliefs, and ways of communicating than what we are used to here in the U.S. In the same way, organizational culture is the unique blend of values and beliefs that define an organization. It is also the way we interact with one another, how we speak, and the attitudes and feelings we have about our company. In this light, it is easy to see how different companies have different organizational cultures. But let's take this a step further. How or why is this important for the future of business aviation? One example:

A strong and well-established organizational culture can help bring people together with a common cause. One example is the generational gaps that seem to cause much difficulty these days that can be addressed by a strong, well-defined culture. The culture brings people together as opposed to having to order, lecture, or dictate constant commands like "this is how we do things here!" The culture of your company/organization/shop will and should transcend and cut through any preconceived personal or generational differences.

If something called 'organizational culture' really exists, and it certainly does, is it likely that something called 'service culture' also exists? Service culture is very real. Service culture is more specific than organizational culture, because everything relates back to customer service. Instead of talking about values and beliefs in general, we must talk about our values and beliefs about customer service. How, specifically, do we provide service to our customers and to each other? How do we communicate with customers and behave around them? All of these elements and more define service culture. Companies, from executive to employee, that embrace the idea of service culture and work to maintain and improve it are the model organizations of our time. Next month, we will fill in the service culture puzzle more completely and provide distinct dimensions that can help profile any organization and the service it provides. **AMT**

# NEW INNOVATIONS IN COMPOSITES **WILL HELP IMPROVE SAFETY**

A new composite fuselage design decreases the likelihood that passengers will be injured, and the load paths prevent damage from reaching the engine, in emergency landing scenarios

THE USE OF COMPOSITE MATERIALS WAS pioneered in general aviation, dating back to the very beginning when dope and fabric materials were used for covering wings and airframes. In the last few decades, high-strength composites utilized in the airframe and wing structures as well as for skins have become a popular choice among general aviation aircraft manufacturers. After all, composite materials — such as carbon fiber and fiberglass — can be easily molded into complex shapes for aircraft of all sizes. Modern composites are also lighter and stronger than aluminum, and provide excellent longevity.

Cirrus Aircraft — which produces the majority of composite general aviation aircraft globally and recently delivered its 6,000th all-composite aircraft — pioneered much of the efforts to improve the safety of these machines. For example, Cirrus implemented the airframe parachute, mass shedding to move energy away from the cabin in the event of a crash, and designed the forward area of the fuselage to prevent it from "digging in" during an emergency landing and allowing the energy to dissipate over more distance.

But recently, there's been a greater effort to understand how composite structures react in emergency landing scenarios. As *AMT* readers know, while metals tend to deform and absorb energy in a crash, composites tend to flex without as much deformation. This flexing ability is helpful in maintaining the survivable volume of the fuselage, but it can also cause higher loads to transfer onto seats — potentially injuring passengers — or other important parts of the aircraft in ways that metal structures do not.

So Flight Design, which specializes in light sport aircraft, has been working on a design to mitigate this problem. Its C4 airplane features a "SafetyBox" — a fuselage design that includes specifically designed crash absorbers to reduce peak forces on the seats and transfer them to dedicated load paths around the survivable space in the cabin. The interior design decreases the likelihood that passengers will be injured, and the load paths prevent damage from reaching the engine. Flight Design's holistic approach — considering the response of the complete load path in an accident scenario rather than just the design of the seat structure — is similar to that used by the auto industry, and is expected to significantly improve passengers' likelihood of survival in the unfortunate event of an emergency landing.

Flight Design is partnering with NASA to **demonstrate the airplane's capabilities with a full-scale crash test.**

In a great example of international cooperation, Flight Design is partnering with NASA to demonstrate the airplane's capabilities with a full-scale crash test at the Langley crash test site, likely early next year. Once the test is over, Flight Design plans to share the results with other companies in an effort to help the industry learn from its experience.

The results could find their way into new industry standards for structural design that the ASTM's General Aviation Aircraft Committee, F44, is creating. This will help all manufacturers as new certification Part/CS 23 requirements take shape.

Even with these new safety developments, composite aircraft still require unique skill sets for maintenance and repair, with guidance for specific repairs often provided by the airframe manufacturer. As composites grow in utility and use, the need for education among the maintenance community will continue to increase as well.

It's exciting to see a new period of innovation in composites and the important strides our industry continues to make every day to improve safety. I look forward to seeing just how far all-composite aircraft soar in the coming years. **AMT**

**PETE BUNCE** is president and CEO of the General Aviation Manufacturers Association (GAMA), which represents more than 85 of the world's leading manufacturers of general aviation airplanes and rotorcraft, engines, avionics, components, and related services. GAMA's members also operate repair stations, FBOs, pilot and maintenance training facilities and manage fleets of aircraft. For more info: www.gama.aero.

# SURVEY AND RESEARCH PROJECTS REQUEST YOUR INPUT

## AIRCRAFT MAINTENANCE TECHNICIAN DECISION-MAKING

Robert Norcross, a doctoral student at Northcentral University in Arizona, is conducting a research study about aircraft maintenance technician decision-making processes when aircraft repair information is not in the aircraft maintenance repair manuals. Focus group sessions will be held to gain your valuable experience, views, and opinions on nine questions pertaining to the research topic. The focus group sessions should last between 30 and 60 minutes and held at a date and time convenient for you. The focus group sessions will use www.gotomeeting.com and a conference call phone number.

You are eligible to participate in this research if you: Are older than 18 years of age; Hold a FAA issued Airframe and Power Plant certificate issued on or before 1 January 2010; and Are a resident of the United States.

There are minimal risks in this study. Some possible risks include: discomfort sharing views about the proposed research questions or other participants knowing your identity. To decrease the impact of these risks: you can refuse to answer any question, stop participating at any time, or request to answer the questions with a phone call to the researcher.

If you decide to participate, there is no direct benefits/compensation to you. The potential benefits to others are improved efficiency and less time and money spent reworking aircraft discrepancies. If you are interested in participating please contact Robert Norcross at R.Norcross4749@email.ncu.edu or 757-281-9289.

## PROVIDE YOUR FEEDBACK ON FAILURE TO FOLLOW PROCEDURES

Volunteers are needed to take a survey for research into failure to follow procedures. If you have experiences to share about the causes of failure to follow procedures on Part 121 aircraft in the maintenance world, we would like to hear from you! Your experiences uniquely describe the daily events in the aviation maintenance hangar and can provide critical information that may identify, mitigate, or even prevent failures to follow procedures in the future. In this survey, we will be asking supervisors, AMTs, other maintenance professionals with Part 121 aircraft experience to answer multiple choice format questions and share your experiences in paragraph format. This is a rare opportunity to shape what is currently known about failures to follow procedure and positively impact aviation mechanics within the industry. We appreciate your time and thank you for your participation in advance.

Click the following link or type the address into the address bar of your Internet browser to complete the survey: www.tinyurl.com/FFP-AMT

Who is conducting this research?

Alex Chaparro, PhD (Alex.Chaparro@wichita.edu), and Brady Patzer (bspatzer@wichita.edu) of Wichita State University (WSU). WSU is an FAA Center for Excellence in the area of Composites and Advanced Materials. The project is sponsored by the FAA Civil Aerospace Medical Institute, in Oklahoma City, OK.

## 2016 LIVE IA REFRESHER TRAINING EVENT SCHEDULE

*AMTSociety*, the training arm of *Aircraft Maintenance Technology* Magazine, announces the following dates and locations for our LIVE Inspection Authorization Refresher Training events for 2016.

**Atlanta, Georgia**
Friday, January 8, 2016
Hilton Garden Inn Atlanta Airport Millennium Center
2301 Sullivan Road, College Park, GA 30337

**Denver, Colorado**
Friday, January 22, 2016
The Summit Conference and Event Center
411 Sable Blvd., Aurora, CO 80011

**Kansas City, Missouri**
Wednesday, February 10, 2016
Holiday Inn KCI Expo Center
11730 NW Ambassador Dr., Kansas City, MO 64153

Registration begins at 7:00 a.m. The first session begins at 8:00 a.m. and they conclude at 5:00 p.m. Visit with exhibitors and hear technical presentations from industry-leading companies, notable speakers, and FAA representatives. Completion certificates will be distributed at the end of the day. The registration page on www.amtsociety.org will be updated soon. Go to the LIVE IA Refresher Training page to confirm the dates and register.

# PRECEDENT HAS BEEN SET

What would happen if an aviation law judge reevaluated Congress's intent? Any regulation or policy would be fair game.

*By Stephen Carbone*

MOM ALWAYS SAID, "WATCH WHAT YOU SAY."

When my youngest was two he was halfway through building a Lincoln Log house when dinner was ready; I promised he could finish it after dinner. Two years later, he's working on another structure … at 11:00 p.m. He reminded me that I said it was OK to build stuff after dinner. "Why not now?" he asked. A child's memory is ironclad; precedent had been set.

I read the Supreme Court's (SCOTUS) opinion/dissent on the Affordable Care Act (ACA) decision. SCOTUS's judgment is irrelevant. But how the judgment was reached is relevant because precedent has been set. Read the news, common words and phrases are being stretched like a Silly Putty comic book picture. Political emotions are hobbling normal discourse and will, ultimately, affect the foundations of aviation safety.

It's a stretch associating a SCOTUS decision with aviation safety. SCOTUS is the Mount Olympus of the courts; it interprets federal law as it is written, deciding if said law is constitutional — as written. SCOTUS can't rewrite law or assume its writer's intent. In other words, a Justice can't say, "Senator Jones wrote this, but I know he meant that."

SCOTUS is the 'go-to' authority; any decision becomes the precedent lower courts point to. A SCOTUS decision is an immovable object; once made cannot be unmade, whether right or wrong. My concern is that the ACA decision was made, not on the intent of what was written, but on interpretation of the author's intent, despite what was written. Because of this possibility, precedent has been set.

## FEDERAL AVIATION REGULATIONS

We, in aviation, are governed by federal rules and regulations — written jointly by industry and government; they are words that are subject to interpretation, often by law judges. The Code of Federal Regulations (CFR) are written and approved by the Legislative (Congress) branch and enforced by the Executive branch. A majority of aviation's regulations under Title 14 of the CFRs are broken down further into Parts and Subparts, e.g. 43, 65, and 91.

Federal Aviation Regulations usually go through a three-year (minimum) vetting process; industry, FAA, lawyers, subject matter experts, accountants, etc. are gathered together to write, comment on and rewrite each new or revised regulation. Every regulation change, even a single word, e.g. 'should' to 'shall', must go through this laborious and expensive process. But what would happen if an aviation law judge reevaluated Congress's intent? Any regulation or policy would be fair game. Why? Because SCOTUS already did it. Precedent has been set.

## MATTER OF INTERPRETATION

Example: 14 CFR Part 65.71 (a) states: "To be eligible for a mechanic certificate and associated ratings, a person must, (2) Be able to read, write, speak, and understand the English language …" This regulation's been followed by the aviation community since the Earth cooled.

Scenario: Aviation Law Judge Smith hears a case where a young Ecuadorian man, who only speaks Spanish, was denied an A&P certificate based on 14 CFR Part 65.71 (a) (2). Smith reads the legal brief and finds the young man is a brilliant mechanic. Smith determines that many cities employ Spanish as a second language. By using the ACA decision as a precedent, he can justify tweeking the regulation, saying, "The original rule's writers couldn't foresee our multilingual country today. I know they would've come to the same conclusion." The happy young man receives his A&P; Smith is applauded for interpreting the rule's writers' intent.

Far-fetched? Maybe, but not impossible. And what will Judge Smith do when a young woman who only speaks Japanese wants the same courtesy? It's a slippery slope when judges and lawyers step outside of their area of expertise and, even, their purview.

## MANIPULATION OF INTENT

I once investigated an accident where the mechanics interpreted the intent, order, and importance of the manufacturer's maintenance procedure steps.

**STEPHEN CARBONE** is an avid writer of aviation fiction; his first novel *Jet Blast* has appealed to mechanics, pilots, air traffic controllers, etc. by giving accurate depictions of the accident investigation process. A former airline mechanic, he has been involved in many aspects of commercial aviation and went on to investigate major aviation accidents for the NTSB. A member of ISASI, Stephen holds a Master's degree in systems safety from ERAU. His weekly blog can be found at: http://jetblast.tateauthor.com

Their interpretations proved fatal; they felt that the manufacturer had meant this … not that; swearing that their decisions were based on professional opinions and years of experience. These promises, however, had no effect on the accident's outcome: the aircraft was still destroyed; their careers still questionable; families were still ruined; and the victims were still dead.

Manipulation of intent has been happening for a long time. For instance, in 1990, the Americans with Disabilities Act was passed to give relief to legitimate people with real handicaps, e.g. blindness. This Act made it possible for those truly handicapped to have their trained service animals accompany them while flying; this included war veterans who need trained emotional support animals.

What followed was, to me, a full blown abuse of 14 CFR Part 382 — Nondiscrimination on the Basis of Handicap in Air Travel, a regulation designed for those with handicaps who deserved and/or earned it. Instead every excuse was twisted to allow Fluffy the Persian cat, et al, to be labeled as an emotional support animal. Again, intent, not wording, was interpreted and precedent had been set. The abuse in this case does three things: casts doubt on 14 CFR Part 382's validity, allows selfish people to exploit the regulation, and contributes to a very unsafe environment.

If you ever get the chance to participate in a simulated cabin fire escape drill, DO IT! Trying to find aisle lights in a smoke-filled aircraft isn't easy; there's legitimate confusion; you can't breathe or see, and you have no idea where you are.

But in a real emergency add an untrained and freaked out Fluffy, hell-bent on survival. The door's now opened for reinterpreting law. Precedent has been set. As Justice Scalia noted in his dissent, "[It's] pure applesauce." ***AMT***

## SOFTWARE



## EDUCATION & TRAINING



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## AIRCRAFT/ENGINE PARTS



## CAREER



## ADVERTISERS' INDEX

# REDRESS YOUR **AVIATION GRIEVANCES**

## The right to petition the government is so fundamental to the American political ideal that it was among the first individual rights guaranteed by the U.S. Constitution

Engaging with the government is not always easy, but persistence is key to aviation safety and business success. Contrary to what you may think, angry mobs with pitchforks don't form over compliance issues. Even more importantly, anger, mobs, and pitchforks have very little impact on the highly regulated civil aviation industry. We have more modern and civilized tools for righting regulatory wrongs.


**Two underutilized approaches to working with the FAA are petitions for rulemaking and petitions for exemption.** A petition for rulemaking asks the FAA to either create a new regulation or change or repeal an existing one . . . a petition for exemption simply asks the agency not to apply an existing rule.

Two underutilized approaches to working with the agency are petitions for rulemaking and petitions for exemption. A petition for rulemaking asks the FAA to either create a new regulation or change or repeal an existing one. On the other hand, a petition for exemption simply asks the agency not to apply an existing rule.

Petitioning the government when dissatisfied is deeply rooted in law and history. The right to petition the government is so fundamental to the American political ideal that it was among the first individual rights guaranteed by the U.S. Constitution. Along with the better known guarantees of free speech, religion, and press, as well as the right to peaceably assemble, the First Amendment ensures Americans a right to "petition the Government for a redress of grievances."

While the FAA is no King George III — a man whose actions spurred many an angry mob — the people affected by its regulations have plenty of grievances to redress. Title 14 Code of Federal Regulations (14 CFR) part 11 lays out the specific requirements for petitions for rulemaking and exemption. Each petition has its own criteria, including whether the proposed action serves the public interest or provides a comparable level of safety to current rules as well as supporting facts, circumstances, information, and arguments. The agency's rules say it must notify the petitioner of a decision in writing, and if denied, a petition for reconsideration may be submitted within 60 days.

No matter the outcome, petitioning for rulemaking or exemption can be a meaningful way to implement change or call attention to a matter. When the existing regulatory framework doesn't allow a particular action or inaction, consider asking for a change in the rule, or for exemption from it.

Have a problem with the FAA's regulations? Leave your militias at home, but don't suffer silently: pull out your pen and exercise the basic right to petition your government! **AMT**

**LAURA VLIEG** is an associate at the law firm of Obadal, Filler, MacLeod & Klein, where she also serves ARSA as a regulatory affairs manager.

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